Resident duty hours in surgery for ensuring patient safety, providing optimum resident education and training, and promoting resident well-being: A response from the American College of Surgeons to the Report of the Institute of Medicine, “Resident Duty Hours: Enhancing Sleep, Supervision, and Safety”

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BACKGROUND

In 2007 at the request of Congress, the Institute of Medicine (IOM) convened the Committee on Optimizing Graduate Medical Trainee (Resident) Hours and Work Schedules to Improve Patient Safety in order to:

1) synthesize current evidence on medical resident schedules and healthcare safety, and 2) develop strategies to enable optimization of work schedules to improve safety in the healthcare work environment, . . . [and] Consider also evidence on the safety of the residents, the education and training experience of the residents, the quality of the interactions from both the resident and patient perspective, and other aspects of safety and quality of care such as care hand-offs and transitions.

The IOM Committee conducted a review of research studies on the impact of duty hour requirements mandated by the Accreditation Council for Graduate Medical Education (ACGME) in 2003; examined scientific data relating to sleep, fatigue, work, and performance; and convened a series of public and private hearings involving individuals and organizations who were invited to testify before the Committee.

As the umbrella organization for all surgical specialties, the American College of Surgeons (ACS) was invited to appear before the IOM Committee. ACS President Gerald B. Healy, MD, FACS, FRCISI (Hon), FRCSE (Hon), appointed a special Task Force to conduct a thorough analysis of the impact of resident duty hour restrictions on patient safety, and the education and training of surgery residents. The ACS Task Force was chaired by L. D. Britt, MD, MPH, FACS; included leaders from a variety of surgical specialties; and was provided guidance and support by the ACS Division of Education. Following a thorough review, the Task Force developed a position paper addressing restrictions on resident duty hours that was forwarded to the IOM Committee, and the ACS leadership testified before the IOM Committee on March 4, 2008. The ACS Position Statement was formally approved by the ACS Board of Regents as a Statement of the ACS in October 2008.

In December 2008, the IOM released the report “Resident Duty Hours: Enhancing Sleep, Supervision, and Safety.”
Supervision, and Safety.” The ACS continued to participate in discussions relating to the IOM Report with leaders of various surgical specialty organizations and with the ACGME in a number of national forums. Another broad-based, special Task Force representing all the surgical specialties was appointed by the ACS to prepare a response to the IOM Report for submission to the ACGME. The ACS Task Force has developed this Response, which includes the following sections:

I. Introduction to Related Activities of the American College of Surgeons
II. Underpinnings of the Education and Training Model for Surgery Residents
III. Summary of Analysis of the Impact of the Current ACGME Duty Hour Regulations
IV. Recommendations from the ACS Position Statement Presented to the IOM Consensus Committee in March 2008
V. ACS Response to the Recommendations of the December 2008 IOM Report, including General Principles and Specific Responses to the IOM Committee Recommendations
VI. Closing Comments

I. INTRODUCTION TO RELATED ACTIVITIES OF THE AMERICAN COLLEGE OF SURGEONS

The American College of Surgeons (ACS) was founded in 1913 and is the umbrella organization for the House of Surgery, including the specialties of general surgery, cardiothoracic surgery, colon and rectal surgery, gynecology and obstetrics, neurological surgery, ophthalmic surgery, orthopaedic surgery, otolaryngology—head and neck surgery, pediatric surgery, plastic and maxillofacial surgery, urology, and vascular surgery. The mission of the ACS is to support the delivery of optimum patient care and promote patient safety through its 74,000 members. The ACS has pursued this mission through a broad spectrum of seminal programs that have established new benchmarks for the profession of surgery. These programs have been developed to measure and improve the quality of surgical care, and have focused on surgeons, members of the surgical team, and systems of care.

The educational activities of the ACS are based on principles of contemporary surgical education and address surgical knowledge and skills and the other core competencies in an integrated fashion. Educational programs have been especially designed to positively impact the care of patients through a continuous process of practice-based learning and improvement. Support for safe introduction of new procedures and technologies into surgical practice has been a major area of focus of the ACS. Effective teamwork has been addressed through the application of teamwork principles from aviation to the operating room. Also, special programs have been designed to teach exemplary professionalism and effective communication in a variety of surgical settings. The ACS is currently developing educational programs focusing on communication skills to improve the transfer of patient care from one provider or team to the next. This is critical to the delivery of safe patient care because of the ever increasing complexity of surgical systems, and the more frequent need to transfer the care of patients in order to comply with the ACGME restrictions on resident duty hours. In addition, simulation-based surgical education has formed the basis of a number of innovative educational programs developed and launched by the ACS. Many educational programs of the ACS are aimed at addressing the evolving needs of practicing surgeons, surgery residents, and members of the surgical team in this changing milieu of healthcare and education. The ACS has been, and continues to be, especially interested in residency education because of the need to educate and train a skilled workforce for the future and to provide safe patient care. The ACS strongly supports optimum education and training of residents to provide patient care of the highest quality, and to inculcate in residents a profound sense of professionalism and responsibility towards patients.

II. UNDERPINNINGS OF THE EDUCATION AND TRAINING MODEL FOR SURGERY RESIDENTS

The combined priorities of quality medical and surgical care, excellence in education and training, and patient safety have been the cornerstone of this nation’s healthcare system, and this trio of priorities has been embraced by learners at every level, from undergraduate and graduate medical education to continuing medical education. The current emphasis by the ACGME on the 6 core competencies and the establishment of the Maintenance of Certification (MOC) process by member boards of the American Board of Medical Specialties (ABMS) are a testament to the continuous improvement undertaken to ensure sustained quality healthcare, which is the underpinning of any patient safety initiative. In addition, the ACS has specifically focused on technical skills as a seventh core competency in designing and implementing new educational programs, because of its relevance to surgery.
Optimal training of surgery residents requires a longitudinal, comprehensive curriculum that focuses on the cognitive elements, technical skills, and judgment that are essential to providing safe patient care. The educational process involves progressive transfer of responsibility from faculty to residents over a period of time, and the close professional relationship between faculty and residents helps to ensure optimum outcomes. Achievement of expertise requires sustained deliberate practice, and retention of skills requires periodic reinforcement. Structured experiences in simulated environments are important in achieving the requisite knowledge and skills and must be integrated with clinical experiences for the best outcomes. The longitudinal educational and training model in surgery promotes a sense of personal responsibility for the care and welfare of patients and fosters professionalism.

The surgical boards, academies, and residency review committees have worked together to develop standards and state-of-the-art curricula that are especially designed to address the aforementioned elements and to promote patient safety. The educational goals are difficult, if not impossible, to achieve during limited experiences that do not permit appropriate coverage of the content and adequate interaction between the faculty and residents. In particular, education and training relating to diagnosis and management of emergencies and critical conditions may be severely compromised with additional restrictions on duty hours. These key elements of the educational and training model in surgery must be considered and addressed in order to provide optimum patient care and offer residents the requisite experiences for them to function as safe and effective members of the current and future workforce.

Surgeons and educators agree that the base of knowledge and skills required to be proficient practitioners has expanded rather than contracted in recent years. Many residents concerned about their readiness to enter practice are selecting sub-specialty fellowship training in order to feel more prepared. Further restrictions in the hours available for training may result in patients being cared for by less qualified surgeons. Alternatively, the length of training programs could be expanded; however, this would be an additional deterrent to medical students considering surgery as a career, many of whom are already daunted by the prospect of the length of surgical training and its impact on repayment of educational debt. The country is experiencing a major shortage of surgeons. If medical students are deterred from entering surgery, the workforce shortage will be exacerbated and patients will encounter increasing difficulty in finding well trained surgeons and accessing quality surgical care. This workforce shortage will most likely be accentuated further with the current national moves to provide universal healthcare.

III. SUMMARY OF ANALYSIS OF THE IMPACT OF THE CURRENT ACGME DUTY HOUR REGULATIONS

The current restrictions on resident duty hours were implemented by the ACGME in 2003, in an attempt to improve patient safety and promote the well-being of residents. The efforts of many investigators to study the impact of the ACGME-mandated duty hours on patient care and safety, resident education and training, individual residents, and others have yielded mixed findings. These findings have been summarized in a recent comprehensive review. The adverse effects of reduced duty hours have been described in the medical literature from the United Kingdom (UK) and throughout Europe, where severe restrictions on duty hours have been implemented. The European Working Time Directive (EWTD) was initiated for the “protection of the clinical personnel against overwork for the benefit of patients.” With over a decade of experience with the EWTD, it has been considered by the greater medical community as a failure that has resulted in inadequately trained
physicians. A position paper of the Surgical Disciplines of the Countries of the European Union describes the EWTD as an initiative that “. . . destroys developed structures of training medical specialists and is in strict and severe conflict with the training of competent surgical specialists . . . .” 23 This paper also notes that published studies have demonstrated that no matter how efficient hand-over systems become, the loss in continuity of care has a detrimental effect on safe patient care.

The Association of Surgeons in Training (ASIT) at the Royal College of Surgeons of England highlighted that the EWTD has been “severely detrimental” to surgical training. Observed reductions in index operative cases performed in a large study of surgical trainee logbooks were cited. ASIT also reported that EWTD resulted in suboptimal patient care within the current National Health Service through poorly structured work patterns leading to cumulative fatigue, increased incidence of medical errors, and decreased continuity of care. 24 For these reasons, efforts are underway in the UK to underscore the differences in the training requirements of surgery as compared to many other medical disciplines, and attempts are being made to prevent further erosion in surgical training that will result from the new European directives regarding work hours. 25

Impact on resident education and training. Surgical residency programs must ensure sufficient training and experience with progressively increasing responsibilities for residents at higher levels of training. Appropriate educational opportunities need to be provided to residents to acquire the requisite knowledge and skills to graduate as proficient surgeons. Studies on the impact of the current duty hour restrictions on the training and education of residents have shown mixed results. In regard to operative volume, approximately equal numbers of studies have reported improvement, no change, or negative impact. 15,26-30 Of special concern is the finding that the experience of residents in a first assistant role in the operating room has been negatively impacted. 31 Experience as the first assistant is extremely important to prepare residents to assume responsibilities as operating surgeons later in their training, and the full impact of this reduced experience may not yet be realized. Also, experience as primary surgeon during early years of residency has been found to decrease. 32 A decrease in clinic attendance and conference attendance also has been reported. 33,34 Another area of concern relates to the negative impact of restricted duty hours on the professional development of residents. 10 In contrast, a number of studies have revealed improvement in the American Board of Surgery In-Training Examination (ABSITE) scores, especially for junior residents. 10,35

Impact on individual residents. The perceptions of surgery residents are important to consider in the evaluation of the impact of restricted resident duty hours. A survey of members of the ACS Resident and Associate Society revealed that 41% of 599 respondents stated that the current duty hour restrictions were a considerable or moderate barrier to their education. The responses were highly correlated with year of training, regardless of program size, or specialty. Senior residents were more likely than junior residents to perceive duty hour restrictions as an important barrier to their education and training. 36 Many residents expressed frustration regarding the lack of flexibility in the duty hour regulations and expressed a need to spend more time in the operating room and in continuity of patient care activities, particularly when unique learning opportunities arise. The concern of senior residents regarding their readiness for practice is underscored by the increasing number of general surgery chiefs planning to seek fellowships, which reached a new high of 77% in 2005. 37

The aforementioned findings underscore the need for greater flexibility in resident duty hours, even if the total number of hours remains at the current 80 hours per week. This is especially true during the senior years of training to prepare residents for future practice. The lack of flexibility in duty hour requirements places residents in ethical dilemmas resulting from their desire to provide the best care for patients, address their educational and training needs, and meet reporting requirements while not placing their training programs in violation of duty hour requirements. 38,39

The impact of the current duty hour restrictions on the quality of life of surgery residents has also received considerable attention. Findings from reported studies reveal that the quality of life of surgical residents appears to have generally improved or has shown no change. 10,15,40 Thus, the reported improvements in resident quality of life may be offset by concerns regarding readiness for independent practice.

Impact on others. The impact of resident duty hour restrictions on the surgical faculty must also be considered to ensure recruitment and retention of faculty members to provide education, training, and mentorship to residents. Surveys of faculty have revealed their concerns regarding transfer of work from residents to faculty, decreased time for...
teaching and research, and negative impact on their quality of life inside and outside the hospital.10,41,42 A survey of surgery faculty at one institution revealed concerns about academic productivity; however, no changes were noted in faculty work hours or clinical productivity.43

The impact of restricted duty hours on medical students needs to be considered, as well. One study found that students completing their surgery clerkship the same year as implementation of the work hour restrictions reported a negative impact on their ability to manage patient problems, lower levels in the clarity of expectations, and a lower quality of feedback, as compared with students who had completed their surgery clerkship prior to duty hour restrictions.44 A decrease in the involvement of residents in medical student education is an unintended consequence of duty hour restrictions. The reduced interaction negatively impacts the education of medical students and also diminishes the residents’ teaching opportunities, which are important for their learning and professional development.

A variety of strategies have been used to offset the reduction in duty hours, including the use of physician extenders. An area of concern expressed by residents is the involvement in the operating room of physician extenders initially hired to ease the residents’ workload, while residents are relegated to performing routine work on the surgical floors.36 Also, the need for an increase in the number of personnel requires additional resources that are not readily available in the current economic environment. Substantial increases in resources needed to support residency programs may compromise the financial well-being of institutions and lead to some teaching hospitals divesting themselves of graduate medical education activities. A reduction in the number of surgery residency programs at a time when more and not fewer programs are needed will compound the projected workforce shortage.

IV. RECOMMENDATIONS FROM THE ACS POSITION STATEMENT PRESENTED TO THE IOM CONSENSUS COMMITTEE IN MARCH 2008

The conclusions and recommendations of the first ACS Task Force presented to the IOM Consensus Committee in March 2008 are as follows.45 The Task Force stated that the ACS supports all efforts to enhance patient safety that include thoughtful, evidence-based evaluation of the important contributing factors and the potential outcomes of such efforts. The Task Force emphasized that the impact of resident duty hours should not be addressed in isolation and without appropriate evidence; rather, it must be considered in the broader context of systems of patient care and surgical education, including continuity of care and handovers, a comprehensive curriculum to produce skilled surgeons, team training to enhance safety, costs to the healthcare system, and implications for access to high quality care for patients.

Five specific recommendations were made by the Task Force in its 2008 Statement. The first stated that a fully funded, multi-institutional study should be recommended by the Institute of Medicine to evaluate not only the impact of further reductions in duty hours but myriad other issues, including optimal duty hours to achieve curriculum objectives, to maintain continuity of care, and to address team training efforts. Discipline-specific outcome measures are needed in the areas of surgical patient safety and surgery resident education. This first recommendation is still important, because most of the studies completed to date are based on experiences at single institutions and are limited by small sample sizes and problems with generalizability. The second recommendation addressed the need for effective team training initiatives to be established with emphasis on patient safety. The third recommendation called for the integration of advanced information technology and simulation in all aspects of surgical residency training and healthcare delivery in order to enhance educational experiences and ensure patient safety. The fourth recommendation addressed the unique role and educational needs of the chief surgical resident, and the importance of exempting chief residents from duty hour restrictions that preclude acquisition of the requisite knowledge and skills for future practice, including full and independent patient responsibility. The fifth recommendation stated that the restrictive “cap” on graduate medical education (GME) positions funded by the Centers for Medicare and Medicaid Services (CMS) should be removed. The inability to increase residency training positions would be counterproductive to the current efforts to expand the undergraduate medical student pool in order to meet the future workforce needs.

V. ACS RESPONSE TO THE RECOMMENDATIONS OF THE DECEMBER 2008 IOM REPORT

The ACS appointed a second broad-based Task Force to review the recommendations of the December 2008 IOM Report and develop a response to these recommendations. The second
ACS Task Force was also chaired by L. D. Britt, MD, MPH, FACS, Chair of ACS Board of Regents, and included leaders of the ACS, chairs of all the surgery residency review committees, leaders from various surgical specialty boards, and leadership of the Association of Program Directors in Surgery and the ACS Resident and Associate Society. The ACS Division of Education again provided guidance and support for this Task Force. Conclusions of the Task Force are presented below in 2 sections: General Principles and Specific Responses.

**General principles.** Key priorities and goals: Consideration of restrictions on resident duty hours must take into account 3 priorities: safe patient care of the highest quality, appropriate education and training of surgery residents, and the well-being of surgery residents. The goal of providing safe patient care must be coupled with the goal of educating and training a skilled workforce for the future. Also, strategies must be implemented to promote the well-being of surgery residents. Balancing these priorities is a delicate matter requiring very careful consideration, as overemphasis on one will detract from the others. Limited short-term gains must not be permitted to compromise the long-term goal of ensuring access of the public to well-trained surgeons.

**Unique aspects of surgery:** The profession of surgery is unique because of the often invasive and acute nature of surgical treatment. Patients place their trust in the hands of surgeons and surgical teams and in return, expect total commitment to their care and welfare. Surgeons must exhibit the deepest sense of responsibility and unwavering commitment to their patients. The culture of surgery mandates that the surgeon who performs the operation is ultimately responsible for the patient. A team effort is essential, but in the end, the surgeon who performed the operation is responsible, regardless of the clock. Because it is highly unlikely that the number of surgeons per 1,000 population will increase in the foreseeable future, surgeons must be prepared to extend themselves as necessary for the good of their patients. Part of this intense commitment to patients is innate in those who select surgery as a career. The other part is a result of training. Young surgeons cannot be deprived of the opportunity to prepare themselves appropriately to care for future surgical patients in their hour of need.

The surgical education and training model involves acquisition of knowledge, technical skills, and judgment through a longitudinal and structured experience. Residents need to be involved in all facets of patient care and participate in operations and procedures, assuming greater responsibility as they progress through the residency program. Acquisition of technical skills and judgment takes time and experience. Expertise is attained through deliberate practice using simulation and subsequent transfer of the newly acquired skills to real environments. This intense, immersive model is necessary for residents to acquire the requisite knowledge and skills to function as independent surgeons. Changes in duty hours that negatively impact this structured surgical education and training model will adversely affect patient safety.

The unique features of the surgical model for supervision of residents must be preserved and strengthened where necessary, because these features are essential to provide optimum patient care and appropriate mentorship and training to residents. Surgical education and patient care rely on a well-developed team infrastructure wherein junior residents are supervised by midlevel residents, who have immediate access to the chief resident and attending surgeons. All major decisions are made by senior level residents. Critical patient management decisions regarding both operative and nonoperative care are made at the attending surgeon level. This highly structured hierarchy provides the cross-checks and draws upon the expertise of the senior members of the team to provide safe and optimum patient care. It also ensures that residents are assigned increasing responsibility as they gain experience and demonstrate proficiency. Thus, this surgical team concept provides a unique framework of safety for patients and of graded, progressive responsibility for residents.

Any changes in the resident duty hour regulations must ensure that the critical features of the surgical residency education and training model necessary to appropriately prepare the workforce of the future are preserved. Competency-based education and simulation are important in helping to ensure that residents achieve and demonstrate requisite knowledge and skills at various levels of training. However, these approaches cannot replace longitudinal, immersive experiences of adequate length in real environments to prepare residents for practice. Compromising the essential elements of this educational model will not serve the population well, either in the short or in the long term. The needs of various professions warrant different intensities of education, training experiences, and time commitments, in order to perform in a skilled fashion. For
example, the rigorous training of the U.S. Navy SEALs was recently highlighted following a stellar performance in very difficult circumstances. Had they not been subjected to rigorous training in immersive environments, it is unlikely that they would have performed so well. Similarly, the special training needs of surgeons must be considered when contemplating changes in duty hours.

**Flexibility to meet unique needs:** Surgery residents must be provided opportunities to engage in care of patients throughout the critical stages of a patient’s illness. Such continuity of care is vital to providing care of the highest quality and ensuring that those professionals most familiar with the intricacies of the case are available and involved. Continuity is also essential from the educational and training perspective, as it promotes learning and understanding of the constantly evolving events that typically surround patients undergoing operations. Residents cannot be expected to leave patients as they are going into the operating room, or in the middle of an operation, or just after an operation when the patient may be unstable. Untimely departures are detrimental to optimum patient care, do not provide residents the requisite education and training experiences, and do not inculcate professionalism and a sense of responsibility towards the patients. Experience with the continuum of care including pre-, intra-, and postoperative settings is essential for learning, and this critical experience should not be fragmented by artificially imposed time periods. Also, exceptions must be made for especially valuable and uncommon clinical and operative learning experiences.

Because of differences across the various surgical specialties and differences across the years of residency training, appropriate flexibility within the 80-hour week is imperative. Surgical specialties that manage patients with critical and emergency conditions require residents to spend extended hours in the hospital to acquire that experience. These specialties are especially vulnerable to additional restrictions on resident duty hours. Flexibility is also needed for surgery residents in different years of training. Strict duty hour limits may be appropriate for junior level residents who have finite roles in the delivery of patient care. However, senior residents (those in their final 2 years of training, and especially chief residents) who have higher levels of global responsibility for patient care must be afforded greater latitude to function effectively in this role. These final years need to prepare residents for transition to independent practice. Residents must acquire and learn to apply the requisite knowledge and skills to patient care with increasing levels of responsibility, and to manage the care of patients in a progressively more comprehensive manner. Flexibility during these years is essential to provide quality patient care through a highly trained workforce well into the future.

Findings regarding the impact of sleep deprivation on performance must be appropriately extrapolated to the clinical environment. The intensity of experiences in clinical settings, such as the operating room and emergency department, may mitigate many of the side effects of sleep deprivation and fatigue. This important difference in environments, as well as the nature of the tasks and individual capacities, must be considered in implementing duty hour restrictions.

**Responsibilities of self-regulation:** Special educational and training programs should be designed and implemented to teach residents to manage fatigue through prevention and mitigation techniques. Because of the vast individual variations in the need for sleep, residents must be educated in recognizing signs of fatigue, using appropriate opportunities to sleep, and regulating their personal and professional activities.

The desire of residents to be involved in the continuum of patient care and to pursue special and rare educational opportunities must be respected. Residents should not be placed in dilemmas that involve making choices among providing appropriate patient care, pursuing important educational and learning opportunities, placing their residency programs in jeopardy, or leaving the hospital when they are not fatigued. Residents must not be forced to make undesirable choices because of inflexible duty hour regulations.

The ultimate responsibility for patient care and residency education must rest with the respective specialties and must not be regulated by external parties such as the federal government. Self-regulation is a hallmark of the professions. In order to preserve the best elements of patient care and the education and training model in the surgical specialties, those specialties most familiar with these activities must be held accountable and be given the latitude and responsibility for self-regulation. Local monitoring of resident duty hours should be conducted at the program and institutional levels, and the results provided to the ACGME for purposes of overall monitoring. This will provide the optimum balance between local implementation based on specific institutional and specialty needs, and oversight by the ACGME.
Resource constraints: The impact of restrictions on resident duty hours extends to the faculty and medical students, as well as to institutions. The academic productivity and satisfaction of faculty members are likely to decrease. Furthermore, access of medical students to teaching by residents is likely to be negatively impacted. Certain types of work performed by surgery residents cannot be performed by physician extenders, and teaching hospitals may be unable to afford or find the additional clinicians to cover the hours vacated by residents. Many safety net hospitals and smaller residency programs may be unable to meet additional duty hour restrictions and thus may be forced to close their programs at a time when the increased numbers of medical students being graduated to meet the impending shortages, are seeking residency positions. Thus, not only will surgeons of the future be less well trained, there will be fewer of them to meet the increasing demand. These effects must be thoroughly evaluated before significant changes are made to the existing duty hours model.

Specific responses to the IOM committee recommendations. Preventing and mitigating fatigue: The maximum of 80 hours, averaged over 4 weeks, is appropriate for junior level residents. For senior residents (those in their final 2 years of training, and especially chief residents), appropriate flexibility in duty hours must be built into the requirements to provide residents the requisite educational and training experiences and prepare them for the transition to independent practice. Duty hours for senior residents should be based on patient care responsibilities and educational needs. Also, mechanisms to help residents monitor and regulate their activities must be implemented to mitigate the impact of fatigue. Exceptions must be made to permit residents to participate in especially valuable and uncommon clinical and operative experiences. Appropriate steps should be taken by the program directors and faculty to achieve optimum outcomes in regard to the delivery of safe patient care of the highest quality, to provide requisite educational and training experiences to residents, and promote resident well-being. Program directors and institutional officials at the local level should be responsible for ensuring compliance with various resident duty hour regulations.

The duty hour adjustments proposed by the IOM Committee would be severely detrimental to safe and high quality patient care, as well as to optimum resident education. The maximum shift length of 16 hours with a 5-hour protected sleep period is entirely unworkable in the surgical environment, which involves crises and emergencies and rapid changes in the conditions of patients. Surgery residents will be placed in extremely difficult situations if they are asked to hand over patients with acute conditions in order to sleep for 5 hours. The desire of and necessity for residents to provide continuity of care and benefit from the educational experience will make this separation of the residents from patients unrealistic and potentially unsafe. Therefore, the protected sleep period will most likely not be implemented, which will result in 16-hour shifts. Also, when combined with the minimum off-duty requirement of 10 hours, the shift lengths will need to be no longer than 14 hours, given the typical 24-hour time frames. Thus, when integrated with other off-duty requirements, the result would be a work week considerably shorter than 80 hours. Patient care will be negatively impacted because the surgical team hierarchy of junior, mid-level, and senior level residents and corresponding cross-checks will no longer be sustainable. The team will be smaller and fragmented across time, and the number of handovers will be increased, raising the likelihood of errors. Those most knowledgeable about the patient will be unavailable at critical points. For example, residents responsible for postoperative care who have not been involved in the operation may not be sensitive to the possible complications because of lack of firsthand knowledge of the nuances of the case and may take longer to identify unfolding adverse events. Finally, the surgeon-patient relationship will be eroded, and patient satisfaction is likely to decrease.

The new proposed restrictions will be detrimental to resident education and training as well. The disintegration of the hierarchical surgical team will impair the process of assuming graduated responsibility and compromise engagement in the continuity of care. Residents will have more gaps in their comprehension of disease progression and experience with the management of surgical conditions across the continuum of pre-, intra-, and postoperative care. The shorter hours resulting from the proposed adjustments would also contribute to decreased attendance in educational activities outside the operating room, such as conferences and skills laboratory experiences. Many believe that operative experiences of residents have been compromised with the current regulations; shorter hours would exacerbate this problem. The proposed restrictions might also result in more time being spent in the hospital at night when the full range of learning opportunities is not available to the residents. The crucial
mentoring processes among faculty, senior and junior residents would be diluted, and residents may not feel responsible for patients beyond a specified time of day. All of these factors would combine to produce residents who are not as well trained and prepared for independent practice as those who have graduated in the past.

Special educational and training programs should be designed and implemented to teach residents the appropriate use of sleep opportunities and recognition of signs of fatigue. Residents must learn to prevent and mitigate fatigue by carefully regulating their personal and professional activities. This is especially important because of vast individual variations in the need for sleep. Implementation of artificial time controls for residents will fall short of the goals; instead, residents must be provided the support to learn and apply self regulation principles for preventing, mitigating and managing fatigue that will place them in much better stead for the realities of surgical practice beyond residency. In short, inflexible regulations relating to the resident duty hours are not likely to result in optimum patient care, education and training, or resident well-being.

The counting of both internal and external moonlighting in the 80-hour weekly limit is appropriate, and should be monitored and enforced by program directors and institutional officials at the local level.

Improving adherence to current duty hours: The responsibility for implementation and local monitoring of adherence to duty hours should rest with program directors and institutional officials. Oversight should be provided by the ACGME through the creation of appropriate organizational and administrative structures and implementation of effective strategies. The ACGME is the appropriate monitoring agency in view of its regulatory role within the graduate medical education enterprise. The ACGME should work with the various specialties and disciplines, residency review committees, program directors, and institutions to design and implement new mechanisms for enhanced adherence. External agencies and organizations that are not directly involved with graduate medical education and do not possess the knowledge of the intricacies and nuances of education in the various specialties and disciplines should not be involved in the regulation and monitoring of duty hours.

Improving the safety of residents and the public: Appropriate measures should be taken by individual institutions to provide safe transportation for residents if they are too fatigued to drive safely. This is essential for the safety of the residents and the public. Faculty must be highly attuned to the signs of such fatigue among residents.

Optimizing resident education for resident learning and patient safety: Institutions must provide appropriate support to limit the noneducational activities of residents. Steps must be taken to ensure that residents participate in appropriate patient care activities to acquire and maintain their knowledge and skills; however, extraneous workload with no educational value should be assigned to other professionals.

A variety of factors must be taken into account for appropriate and effective assignment of cases and workload. Decisions regarding assignment of cases to residents must be made at the local level and take into consideration a variety of factors, such as the complexity of patient care needs, knowledge and skills of individual residents, educational and training needs of the residents, specialty-specific nuances, systems issues, and resident fatigue. Arbitrary numbers or general guidelines for such assignments will not serve patients or residents well.

The robust features of the highly structured supervision model in the surgical specialties have been articulated in the previous section entitled General Principles. This well defined hierarchy provides the cross-checks and draws upon the expertise of the senior members of the team to provide safe and optimum patient care. It also ensures that residents are assigned increasing responsibility as they gain experience and demonstrate proficiency. These features must be supported and maintained. Clear definition of expectations should help in strengthening the supervision model, where necessary.

Deploying learning systems for handovers and error detection, correction, and reporting: Residents must be offered appropriate training and educational experiences to perform safe handovers, and appropriate information technology should be provided to support their efforts. Training in safe and effective handovers must focus on individual and team responsibilities, effective verbal and written communication, exemplary professionalism, and appropriate use of technology. Such training must address the transfer of critical information to the next team and highlight the responsibility for obtaining all essential information from the departing team. The importance of in-person handovers must be emphasized. Residents should also be provided education and training in specific areas pertaining to patient safety, continuous quality improvement, systems analysis, near misses, error detection and reporting, root cause analysis,
and systems of care. Specifically, residents should participate regularly in conferences focusing on quality improvement and education, such as Mor-
Bidity and Mortality Conferences, to learn the principles and practice of patient safety, systems of care, and continuous quality improvement.

Obtaining additional resources for implementation: Inviting the spectrum of financial stakeholders to support graduate medical education is a worthy goal, but may be difficult to implement in the current healthcare and economic environment.

Monitoring and evaluation: The data needed to monitor implementation, prepare for future adjustments, and identify priorities for evaluation projects should be gathered by individuals from the respective specialties and disciplines in conjunction with the ACGME. An appropriately designed and validated annual resident survey should be used by the ACGME to obtain anonymous resident feedback regarding compliance with duty hours. This would provide valuable information to the ACGME, residency review committees, institutions, and program directors. Aggregate discipline-specific data from the survey could be shared with the respective program directors in addition to the residency review committees, to facilitate the sharing of information, experiences, and solutions across the community of individuals involved with resident education in surgery.

VI. CLOSING COMMENTS

Every resident duty hour schema must take into account the needs to provide safe patient care of the highest quality, ensure optimum education and training for residents that result in a skilled workforce for the future, and promote the well-being of residents. Efforts to enhance the safety of patient care at present must be coupled with the education and training of surgery residents who will be responsible for providing patient care in the future.

The unique nuances relating to patient care and education and training in various specialties and disciplines must be taken into account as further duty hour restrictions are considered. A one-size-fits-all approach will not serve patients or residents well, especially in the surgical specialties.

The goal of residency training in surgery is to ensure that residents acquire the requisite knowledge and skills to provide skilled and safe care to patients. Mastery in surgery requires extensive experiences that extend over a substantial period of time. Also, the hallmark of the surgeon professional is commitment to and responsibility for the continuum of pre-, intra-, and postoperative care for the surgical patient. This critical sense of responsibility is inculcated in residents through appropriate experiences that require sufficient duty hours. Commitment and mastery are respected symbols of this profession that will always be associated with hard work and dedication. The highest level of patient safety and quality care can only be achieved by providing a longitudinal immersive experience in surgical training. The key features of the supervision model, through which the senior residents and faculty are engaged in critical patient care decisions and in mentoring residents, must be maintained.

Patient safety in an environment with escalating challenges (including new treatment paradigms and technologies, along with a growing and aging population) cannot be achieved by arbitrarily changing resident duty hours without thoughtful consideration of all issues impacting the care of the surgical patient. Rather, efforts should be focused on optimal utilization of information technology, electronic health records, telemedicine, and simulation, to better support the healthcare system and residency education in surgery. Such initiatives are needed to facilitate reliable and safe handovers, to streamline work, and to make training more efficient. Development of strategies to improve the system would do more to address quality and patient safety concerns than merely assuming that a reduction of duty hours will improve safety.

After 5 years of experience with the resident duty hour restrictions implemented by the ACGME and numerous studies, the available evidence does not support the notion that decreased resident duty hours have improved the safety of surgical patients. Some recommendations of the IOM Report, such as training in prevention of fatigue and safe handovers, and including moonlighting hours in the 80-hour maximum, are appropriate. In the majority of surgery residency programs, moonlighting is already prohibited.

Other proposed recommendations, particularly relative to adjustments in duty hours, would clearly jeopardize patient care and the capacity of our system to produce highly qualified surgeons. These proposed recommendations would combine to create a less than 80-hour week, resulting in increased handovers, disruption in continuity of care, erosion of the surgeon-patient relationship, and a decrease in patient satisfaction. In addition to the negative impact on patient care, the education and training of future surgeons would be seriously compromised. With shortened hours, residents would be unable to experience the appropriate breadth and depth of surgical conditions, and would be unable to care for patients.
during the pre-, intra-, and postoperative stages of care. Many surgeons and senior residents alike believe that the current 80-hour week is a barrier to education and are concerned that graduating residents are not fully prepared for independent practice. Any further restrictions in resident duty hours also would create gaps in coverage, and the additional personnel needed to fill these gaps would be difficult to find and cost prohibitive. Some programs may be unable to continue to support surgery residency programs, thereby compounding challenges in access to surgical care in both the near- and long-term.

At the time the ACGME duty hour restrictions were implemented, the surgery profession overwhelmingly believed that additional flexibility in the 80-hour week would be necessary for senior level residents (those in their final 2 years of training, and especially chief residents) to make the successful transition to practice. This need for flexibility is even more evident now, following 5 years of experience with the current regulations. Such changes should be implemented immediately to mitigate the negative impact of the current duty hour restrictions. Monitoring and evaluation of compliance with duty hour restrictions should remain the purview of those directly involved in patient care and resident education and training. The ACGME should provide oversight and facilitate research efforts to evaluate the impact of duty hour restrictions. The long-term impact of the duty hour restrictions must be investigated through multi-institutional studies that focus on specific needs of the patients and surgery residents. Patient care, resident education and training, and resident well-being should be the focus of such studies. A thoughtful approach that takes into account the many nuances associated with residency education will ensure delivery of safe patient care of the highest quality, now and well into the future.

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REFERENCES
